

## Editorial

The concept of 'a ceramic' has seen a dramatic change during the last 25 years. This is largely the result of the development in this period of a wide range of high purity ceramic materials with controlled microstructures, possessing closely defined properties and designed for specific applications, for the most part, in the areas of electrical and mechanical engineering.

The principal objective stimulating the development of the high-performance structural ceramics (for example, the silicon nitrides, silicon carbides and sialons) was the realisation of a gas turbine running at a substantially higher temperature than can be achieved with metals. Although the ultimate aim of a commercial high temperature gas turbine using ceramic components has not yet been realised, important uses for these ceramics are already well established, and the number of applications and the quantities of material involved will grow. The automotive industry is very much attracted by the use of ceramics in the Diesel engine, with the attendant promise of increased efficiency in the use of fuel. The main contender in this field is probably the group of zirconia ceramics, with the prospect of a range of tougher and effectively less brittle materials.

At present, the largest market for advanced ceramics exists in the electronics field. Their rapid development started about 40 years ago in parallel with that of the electronics and communications industries. Today, alumina and beryllia are well established as insulators, ferrites as magnetic materials, and titanates as high permittivity piezoelectric and electro-optical components. The constant striving to fully exploit electroceramics is stimulating research into the crystal structure, microstructure and macrostructure/property relationships. This in turn is demanding starting powders of closely defined chemical and physical specifications.

Since the market value of components in many novel applications tends to be high, relatively expensive raw materials can be considered for their manufacture. The use of synthetic raw materials is probably the most

significant distinguishing feature of *high technology* ceramics vis-à-vis the *traditional* ceramics which are of necessity based on indigenous raw materials. However, there will always be an economic limit to the 'ceramic' solution to a problem and much future work will be concerned with the production of powders at the 'right' price. The components required are, moreover, often of very complex shape and have to conform to close dimensional tolerances. Their reliable production, free from performance-inhibiting flaws, is another important field for research and development, linked in turn to the search for the 'ideal' powder.

Until now there has been no journal the primary function of which has been to report on research and development in the field of these advanced ceramics. Publications on this subject are scattered over a variety of journals which cover, for example, general ceramics (often including glass and cement), materials science and engineering, powder technology, and various branches of engineering. The *International Journal of High Technology Ceramics* has the object of bringing together the publication of all matters pertaining to technical ceramics, starting from raw materials through fabrication to their actual application, including aspects of the problems of designing with ceramic materials. One particular aim is to bring into closer association the materials scientist, the ceramic manufacturer and the user. Through the bringing together in one journal the science, technology and applications of materials which may apparently be unrelated, but which nevertheless share important common features, the stimulation and the cross-fertilization of ideas may be the more readily achieved.

Thus it is intended that research papers and reviews will appear concerning powder synthesis, the shaping of components and their consolidation by sintering, the development of special microstructures and the resulting properties of advanced ceramics. As part of these contributions, authors will be asked to state the reason for the work undertaken in the light of the applications envisaged, and to assess whether the work has achieved its technical or economic goal; in the absence of this achievement, the reasons for its failure should be analysed. Additionally, *High Technology Ceramics* will publish regularly a calendar of events of interest to the readership. Brief reports of relevant meetings that have been attended and 'Letters to the Editor' will be welcome.

The Editor is being assisted by members of an international Editorial Board, all of whom are well known for their involvement in high technology ceramics. Jointly, they are determined, by accepting only high quality contributions which have passed an established refereeing procedure, to make *High Technology Ceramics* the leading publication in this field.

**Paul Popper**